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Inclusive tau hadronic decay rate in a renormalon-free gluon condensate scheme

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In a recent work the discrepancy between the QCD perturbation series for the inclusive hadronic tau decay rate computed in the CIPT and FOPT approaches was suggested to be related to a different sensitivity of the two approaches to quartic momenta in the infrared limit. If we make the assumption that the known perturbative correctionsfor the QCD Adler function at the 5-loop level are already governed significantly by the asymptotic behavior related to the gluon condensate renormalon, we can define a renormalon-free scheme for the gluon condensate which is similar to using short-distance quark mass scheme instead of the pole mass. We show how such a scheme can be setup in a concrete way in QCD, and we demonstrate that as a result the discrepancy between CIPT and FOPT is indeed significantly reduced. We use the new scheme in a new measurement of the strong coupling constant.

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